

Name: _____

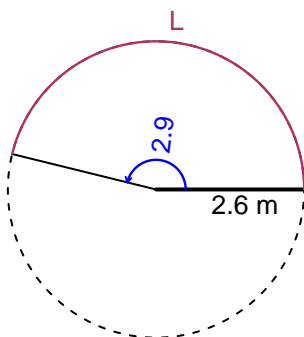
Date: _____

Trig Final (SLTN v669)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 2.6 meters. The angle measure is 2.9 radians. How long is the arc in meters?

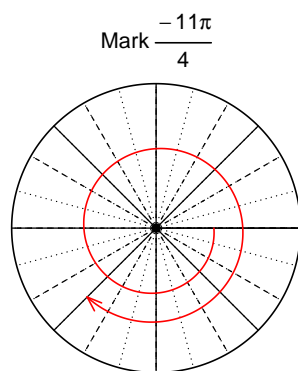


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$L = 7.54$ meters.

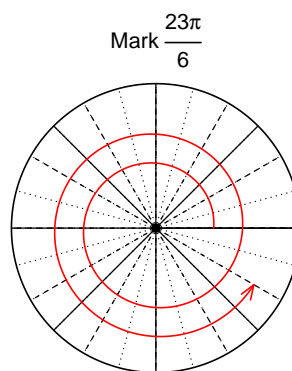
Question 2

Consider angles $-\frac{11\pi}{4}$ and $\frac{23\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{11\pi}{4}\right)$ and $\sin\left(\frac{23\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(-11\pi/4)$

$$\cos(-11\pi/4) = \frac{-\sqrt{2}}{2}$$



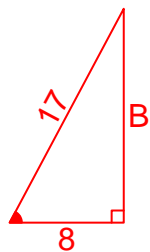
Find $\sin(23\pi/6)$

$$\sin(23\pi/6) = \frac{-1}{2}$$

Question 3

If $\cos(\theta) = \frac{-8}{17}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



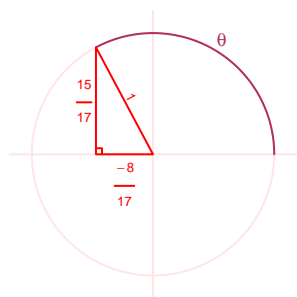
Solve the Pythagorean Equation

$$8^2 + B^2 = 17^2$$

$$B = \sqrt{17^2 - 8^2}$$

$$B = 15$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\tan(\theta) = \frac{\frac{15}{17}}{\frac{-8}{17}} = \frac{-15}{8}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 4.36$ meters, a frequency of 6.69 Hz, and an amplitude of 2.91 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 2.91 \sin(2\pi 6.69t) + 4.36$$

or

$$y = 2.91 \sin(13.38\pi t) + 4.36$$

or

$$y = 2.91 \sin(42.03t) + 4.36$$